

Universally Designed Technology Solutions

People who have difficulty walking
&
The Segway



By Jerry Kerr

For individuals with disabilities which impose a substantial limitation on their ability to walk, the selection of an assistive device which will meet their unique and specific needs is critically important for their physical and mental health, independence, and an acceptable "quality of life".

Mobility related disabilities are not only the most prevalent of all disabilities but also have the greatest impact upon a person's "quality of life".

People who have difficulty walking are less likely to be employed than those having any other disability and are less likely to interact with others outside the home. They are also less likely to exercise and more likely to live a sedentary lifestyle creating an increased risk for other complications.

Prior to 2003 the only practical options for assistive devices were manual wheelchairs, power wheelchairs and scooters. In order to achieve the goals of independence and quality of life and to minimize the impact to the health of the individual from the effects of being seated to achieve mobility, each individual requires assessment in terms of which device is most appropriate for their needs. Criteria utilized in assessment include body size, physical conditioning, manual dexterity and mental acuity.

In the case of wheelchairs they must then be constructed taking into account the body size of the user and custom fitted for seat width, seat depth, seat surface height, backrest height, footrest to seat distance, armrest height, distance between armrest, headrest height, type and size of seat cushion, and type and size of seat back.

Users must then be trained in the safe operation of the specified device, scooter or wheelchair, which includes safely transferring into the device, indoor/outdoor operation of the device, social etiquette, transportation of the device, and maintenance. This training is typically performed by an occupational or physical therapist.

In 2003 the Segway, an electrical personal assistive mobility device (EPAMD) designed utilizing the principles of universal design, became available to the general public. The fundamental premise of universal design is to design products and environments in such a manner that they will be

usable to the greatest extent possible by people of all ages and with differing abilities, respecting human diversity and promoting the inclusion of all people in all activities of life.

Universal Design has seven basic principles:

1. Equitable use: the design is usable and marketable to people with diverse abilities.
2. Flexibility in use: the design accommodates a wide range of individual preferences and abilities
3. Simple and intuitive use: use of the design is easy to understand regardless of the user's experience, knowledge, language skills or current concentration level.
4. Perceptible information: the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities
5. Tolerance for error: the design minimizes hazards and the adverse consequences of accidental or unintended actions.
6. Low physical effort: the design can be used efficiently and comfortably and with a minimum of fatigue.
7. The size and space for approach and use: appropriate size and spaces provided for approach, reach, manipulation, and use regardless of users body size, posture, or mobility.

The Segway is an electrically powered, self balancing, non-tandem two wheeled device, and classified as a consumer product. With its introduction people who had difficulty walking but could stand now had an option available to them which would allow them mobility while allowing them to remain standing. This includes people who have conditions such as multiple sclerosis, spinal cord injuries, Parkinson's disease, amputations, COPD, spina bifida, traumatic burn injuries, traumatic brain injuries, and many neurological conditions.

The Segway has also proven to be highly adaptable to modification allowing even those who are unable to stand, such as paraplegics, to take advantage of its increased maneuverability, particularly in outdoor environments.



For those having the ability to use the Segway as an assistive device it offers them mobility more consistent with that which they enjoyed prior to becoming disabled. They are able to reach things from high shelves, move in and out of tight spaces, including closets and even move about the kitchen in a manner consistent with their pre-disability movements. They are able to better see and be seen when interacting with others. The mere act of passive standing has dramatic physiological and psychological benefits.

Use It or Lose It / Therapeutic Effects of Passive Standing

The act of standing can significantly decrease muscle atrophy particularly in the abdominal, hip flexors, and paraspinal muscles of the body. The act of continued sitting may over time, in many cases, result in the inability of an individual to ever stand again.

Physicians & Therapists recommend standing for many reasons:

- Pressure relief
- Normalizing of kidney and bladder functions
- Improving digestive and bowel function
- Maintenance of bone density
- Improving flexibility and decreasing spasticity
- Greater circulation
- Improving respiration

Pressure Relief

Immobilization or continuous sitting creates pressure that can lead to obstructed blood flow and breakdown of the skin tissue. The resulting wounds are often decubitus ulcers, otherwise known as pressure sores. Passive standing releases pressure by shifting weight to the legs.

Bladder

Immobilization in the sitting position often results in calcium deposits in the urinary tract. In many spinal cord injury cases, controlling the bladder is often not possible creating additional problems in the urinary tract. Passive standing enhances one's ability to more completely empty the bladder which decreases the likelihood of bladder infections.

Digestion

Users of seated mobility devices often experience digestive complications as a result of prolonged immobilization. These complications include constipation, fecal impaction, and other dysfunction. Frequent passive standing encourages peristalsis and more regular bowel movements.

Bones

It has been well documented that continuous sitting inhibits weight bearing, which causes weakening of the bones and ultimately osteoporosis. According to the Journal of Applied Physiology, passive standing can reverse the loss of bone density.

Muscles

Continuous sitting often causes tightening or shortening of the leg muscles. As a result, joints lose flexibility and contractures can form in the knees, ankles and hip joints. Spasticity is a muscular problem often found in spinal cord injury cases and other neurological disorders. A report by James Walter, PhD. and Robert B. Dunn, PhD. found that the use of standing devices increased flexibility and decreased spasticity in the legs.

Circulation

A significant problem for patients with spinal cord injuries is that of insufficient orthostatic circulatory regulation. Due to the loss of sympathetic vascular tone, the skeletal muscle pump, and a decrease in plasma volume, patients with spinal cord injuries have problems maintaining blood pressure and cardiac output. This can become a significant problem if cardiac output is insufficient to maintain oxygen requirements for the vital organs. Although the reason is not fully understood, it is well accepted that repeated and progressive standing can lead to cardiovascular system adaptation producing functional circulation.

Breathing

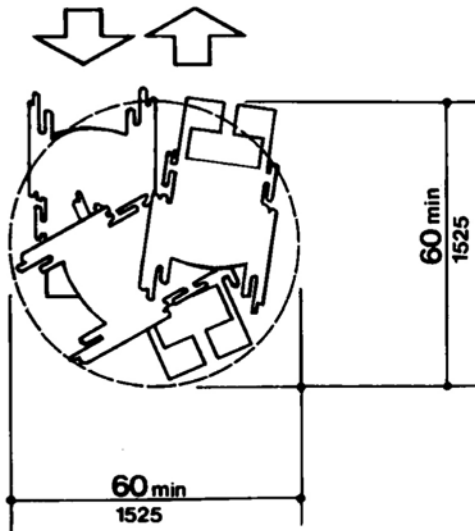
In the supine, or sitting position, a person cannot contract muscles for maximum inhaling and exhaling, which can lead to reduced respiratory efficiency and impairment such as pneumonia. It is widely believed that the standing position can induce better breathing. In a study by the American Physical Therapy Association, more than one third of the respondents reported better breathing after prolonged standing.

Increased Access and Maneuverability



The scoping and technical requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG), established by the United States Access Board, for accessibility to buildings and facilities by individuals with disabilities required under the Americans with Disabilities Act have been in place for almost 15 years. However people with disabilities continue to encounter places of public accommodation which are not in compliance with ADAAG and are inaccessible to them.

They are faced with obstacles such as ramps which are too steep, doorways which are too narrow and turning spaces which are too small to be accessible by those in wheelchairs and scooters. Frequently merchants have made accessible aisle ways and passageways inaccessible by placing product displays and merchandise in a manner which makes them impassible by people with disabilities using wheelchairs or scooters.



(a)
60-in (1525-mm)-Diameter Space

While the maximum incline power wheelchairs and scooters are designed to traverse varies, typically ranging between 5°-14°, they should only be attempted proceeding straight up or straight down the slope.

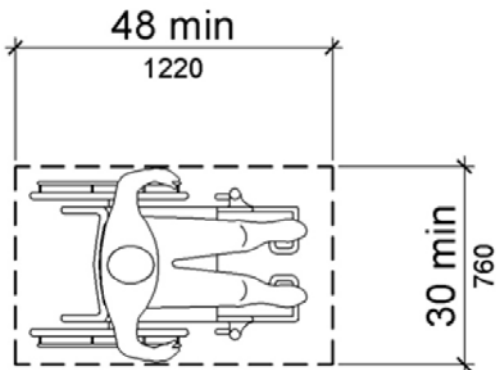


Figure 305.3
Clear Floor or Ground Space

Most wheelchairs are designed to fit within a space of 30" x 48" and are designed to turn around in a

space of 60" x 60". However scooters are not nearly as maneuverable as manual or power wheelchairs and some are unable to maneuver in the minimum space requirements by ADAAG models even utilizing three-point turns.

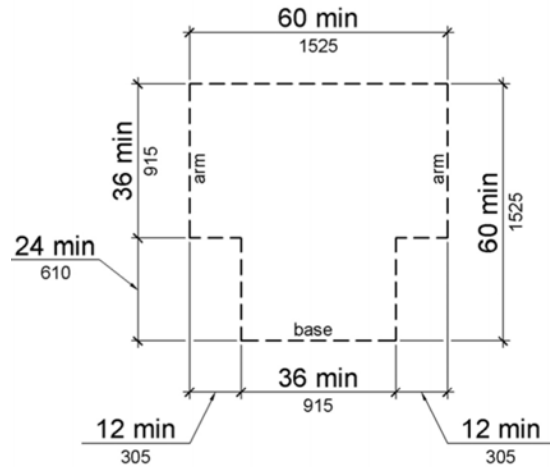
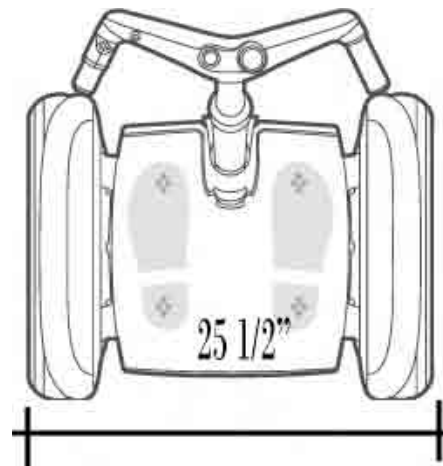


Figure 304.3.2
T-Shaped Turning Space

The footprint of the Segway is much smaller than that of a wheelchair and is able to maneuver in passageways as narrow as 25.5 inches and, because it has a zero turning radius, it can turn around in spaces as small as 25.5 x 25.5 inches.



The Segway is also designed to traverse a 20° slope.

The smaller footprint, zero turning radius and ability to traverse steeper slopes allows the Segway to be used in areas which would otherwise not be accessible in wheelchairs and scooters.

Public Transportation



On September 1, 2005 the Disability Law Coordinating Council of the United States Department of Transportation issued ADA Guidance on the use of "Segways on Transportation Vehicles." The guidance stated "a Segway when used by a person with a disability as a mobility device, is part of the broad class of mobility aids that Part 37 intends will be accommodated in (see for instance §§37.5 and 37.165). In this way, a Segway occupies a legal position analogous to canes, walkers, etc."

For people with disabilities the need for accessible public transportation is vitally important.

Unfortunately, accessible avenues to bus stops, train stations, and subway stops are not always in existence. Sidewalks which are in disrepair, or the lack of sidewalks altogether, lack of curb cuts, and even the lack of a safe accessible pedestrian right-of-way which is wide enough and level enough to allow for the use of mobility devices makes public transportation inaccessible.

Because of its design criteria the Segway is capable of traveling on roadways when sidewalks and shoulders are not available or they have fallen into

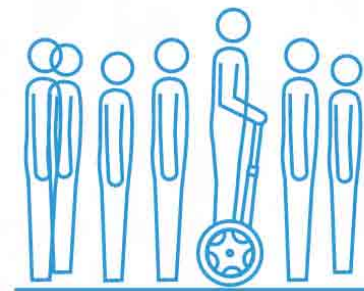
such disrepair that they are impassable by wheelchairs and scooters. It is also capable of traveling on grass surfaces and gravel roadways and shoulders, giving people with disabilities who use Segways greater access to public transportation services than they might have utilizing a power wheelchair or scooter.

Behavior

The behavioral characteristics of people with disabilities utilizing electrically powered wheelchairs, scooters and Segways are remarkably similar and more consistent with whether their activity level is considered "active" or at a "regular" level than when comparing power wheelchair users with scooter or Segway users. The activity level of Segway users is consistent with the activity level of "active" users.

As a general rule people with disabilities who rely upon their assistive device for basic mobility in their activities of daily living are extraordinarily proficient in the use of that particular device and extremely considerate in terms of safety and etiquette when dealing with others.

Their chosen device is regarded by them as an extension of their body.



Even though the users of all powered mobility devices typically operate their device at a speed consistent with that of adjacent pedestrian traffic, because of issues of transportation and issues of safety, acceleration and top speed are important considerations for the users of all powered mobility devices.

Safety

In the assessment of the safety of motorized assistive devices consideration should be given not only to the safety of the user but also to the safety of others who the user will encounter when using the device.

The associated risks for those using motorized assistive devices are commonly falls, tips, and collisions, which may result in fractures, lacerations and contusions/abrasions.

In a study of the FDA database between 1975 and 1993 the proportion of the incidents which were related to scooters was 52.8%, power wheelchairs 24.6% and manual wheelchairs 22.6%.

Subsequent to January 1, 2003, there were 228 injuries and incidents and 17 deaths from the use of scooters which have been reported to the FDA. There have been 309 injuries and incidents and 26 deaths reported from the use of powered wheelchairs.

Most of the above referenced incidents were the result of a failure to operate the device in accordance with the manufacturers' recommendations. However, one representative injury occurred on July 7, 2003 when a customer operating a Rascal motorized scooter in a grocery store was retrieving an item from a freezer door when the freezer door closed grabbing the engager causing the scooter to lurch forward, throwing the operator through the glass freezer door.

A very common incidence of injury is a result of a scooter tipping over causing a head strike by the operator, and is a frequent cause of death for those using scooters.

The National Highway Safety Administration estimated the number of wheelchair users injured or killed in collisions between a wheelchair and a motor vehicle during the period 1991-1995 at

1819. With the dramatic rise in the number of users of motorized scooters and power wheelchairs, it is not surprising that during the period subsequent to January 1, 2003 that a very high percentage of those incidents resulting in death for the power wheelchair operator and to a lesser degree the operators of scooters were a result of being struck by a motor vehicle. Frequently the wheelchair and scooter users were struck while attempting to cross at an intersection or having to use the street due to a lack of curb cuts or sidewalk availability.

While anecdotal evidence suggests that the incidence of injuries sustained by other individuals from collision by those using powered scooters is on the rise, the lack of reported data suggests that the incidents are, while annoying, relatively minor in nature.

Those injuries which were reported to the FDA were all a result of injuries sustained by those encountering the operator of a motorized scooter.

There were no reports in the FDA database subsequent to 2003 of those sustaining injuries through an encounter with a motorized wheelchair.

Segway Inc. does not make public the incidence of injuries to those operating the Segway PT; however in 2003 Segway Inc. recalled 6,000 PT's citing three falls, including one that resulted in a serious head injury. The falls were a result of those using the Segway failing to follow the manufacturer's guidelines, by continuing to operate it even after red warning lights were blinking indicating a low energy level in the battery had been detected requiring them to dismount. A sudden surge in the demand for energy as a result of ignoring this warning caused the unit to fail and fall over. The recall was to make an adjustment in the software of the device forcing it to shut down earlier than it did previously.

In 2006 Segway Inc. recalled all 23,500 PT's to make adjustments in the software when it was discovered that, when operating the Segway PT at full speed, if the operator would jump off of the Segway and then jump back on the platform this could cause the PT's wheels to unexpectedly reverse direction throwing the operator off. Segway said there was a possibility that six incidents that had been reported to them could have been a result of this software glitch.

A recent search of the U. S. Department of Labor OSHA database contained no reports of any Segway related "lost time accidents", accidents, injuries, or fatalities since the Segway first began being used by businesses some two years prior to it being offered for sale to the general public.

Anecdotal evidence suggests that the associated risks for users of the Segway are similar to other mobility devices: most commonly falls which could result in fractures, lacerations and contusions/abrasions with the greatest risk associated with a fall that results in a head strike.

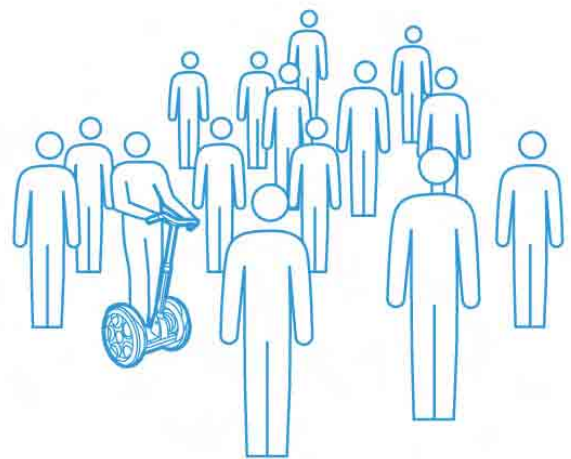
In 2004 59-year-old Ron Huber, a NASCAR driver, while using a Segway in the pit area at the Las Vegas Motor Speedway hit a slick spot causing him to fall and strike his head. The only other known death occurred in 2006 outside the United States in the Cayman Islands; the Segway Dr. Mary Beth Throneberry was operating struck a pothole while she was traveling along a roadway causing her to fall and strike her head.

Neither Huber nor Throneberry was wearing a helmet as recommended by the manufacturer when traveling in an outdoor environment.

Available data indicates that, while adverse incidents do occur to those using the Segway, they are infrequent and relatively minor in nature.

Subsequent to January 1, 2003, when the Segway began being used by the first consumers, there have been no reports in the United States of any serious injury caused to others and no reported deaths to others caused by those using a Segway.

While available data suggests that most adverse incidents regarding the use of any motorized assistive device are the result of the failure to operate the device in accordance with the manufacturer's recommendations. The Segway has design features and technological advancements that make its user less susceptible to some risks and it is clearly the safest of all motorized assistive devices when interacting with others particularly in crowded environments.



A study done by the Victoria Transport Policy Institute which compared the safety of the Segway to that of other mobility devices was presented at the Transportation Research Board's Annual Meeting in January of 2004 in Washington, DC.

In assessing the relative safety of the Segway and its risk to others, the study suggests the Segway represents a medium risk to others consistent with children playing even when operated at top speeds.

The report indicates that motor or powered wheelchairs represent a medium to high risk to others, consistent with equestrians (people on horseback).

The high percentage of deaths for those using motorized scooters and power wheelchairs that occurred from a collision with a motor vehicle is the result of a lack of visibility, longer clearance intervals, and a lack of maneuverability.

Because those using power wheelchairs and motorized scooters are below the sight lines of those operating motor vehicles they are much more susceptible to collision than those who use Segways.



Benjamin Carpenter, 21, was crossing a Michigan highway in his wheelchair when he became stuck in a semi truck's grille. He was pushed for miles before the unknowing driver was pulled over.

The Segway allows its user to stand erect providing them an additional 8 inches in height. This not only allows them better visibility to detect oncoming traffic but it also makes them more visible to the oncoming traffic.

A study conducted by the United States Department of Transportation-Federal Highway Administration in October 2004 found that the Segway ranked first or second in favorable safety characteristics.

The acceleration rate of the Segway was at the high end of all devices allowing for reduced clearance intervals (time necessary to cross an intersection) and its braking distance was second only to that of a manual wheelchair.



The top speed of the Segway, which depending upon the model weighs between 85 – 105 pounds unoccupied, is comparable to that of the fastest power wheelchairs and scooters.

The Segway is designed to ascend and descend slopes of 20° (36%) safely, comparable to higher performing power wheelchairs and scooters and as much as four times as steep as most others.



Bounder wheelchairs have a top speed of 12.2 mph, and the OmegaTrac wheelchair pictured below weighs in excess of 400 pounds unoccupied and can be specially configured for speeds above 12 mph and is capable of handling slopes in excess 20° (36%).



The Pride Mobility Wrangler has a top speed of 10 mph and the Palmer Industries Mobility Scooter pictured below (being used by a patron enjoying Disneyland) weighs in excess of 255 pounds unoccupied and has a top speed of 13 mph and is capable of slopes up 40%. The footprint of the Palmer Scooter is 36" wide and 72"-96" in length depending upon the model.



The enhanced speed and performance allows the users of these devices when necessary to travel in the roadway with a higher degree of safety and less exposure than those operating slower devices.

The Segway has clear size and weight advantages over other mobility devices with similar speed and performance characteristics.

Palmer Industries Scooter
Footprint 36" x 72"

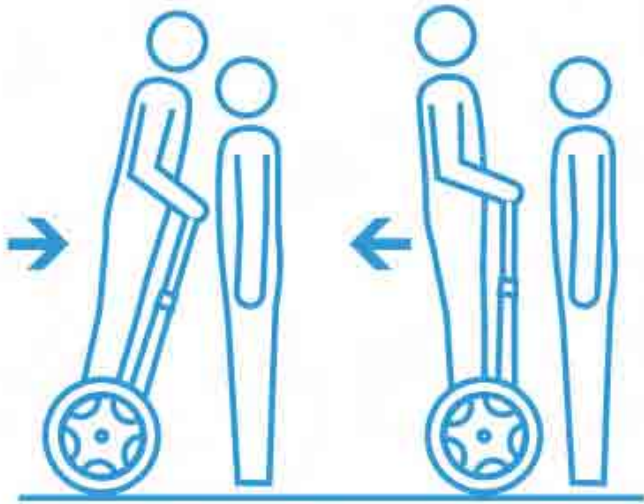
ADAAG Wheelchair
Footprint 30" x 48"

Segway
Footprint
19" x 25"

The Segway's tires are low pressure and are designed to cause no injury when running over the toes or fingers of another person.



One of the primary performance designs for collision avoidance of the Segway is that the natural reaction of a human being, upon recognizing a dangerous situation, invokes a body movement which results in slowing the Segway or stopping it completely.



The self balancing capabilities of the Segway are accomplished through the use of tilt sensors and gyroscopes. This limits the Segway's ability to continue forward if it were to run into another person or obstacle.

Upon that encounter, unlike a power wheelchair or motorized scooter which would continue to propel itself forward, the handlebars would push back causing the tilt sensors to stop the Segway and reverse its forward motion. The most likely strike point of the Segway would be in the upper body area of another human being versus the most likely strike point of the power wheelchair or motorized scooter being below the knee of another person.

The Segway is also designed to shut down in the event its user would become separated from the device when in operation. It is designed and built with redundant systems which allow it, in the event of a mechanical failure, to warn the user of an impending shutdown and safely stop operation.

Historical Resistance to Technological Advancements & Protections under the ADA & The Rehabilitation Act

Historically people with disabilities when presented with technological advancements which would enhance their abilities and improve their quality of life, have frequently encountered resistance to its use. The clearest example of this resistance is the power wheelchair.

In 1986 public transportation officials were resistant to transporting people with disabilities using power wheelchairs aboard transportation vehicles. William Henderson, Transportation Program Director in Everett, Washington speaking at a National Workshop held by the United States Department of Transportation proclaimed that the new high-speed devices (power wheelchairs) were difficult if not impossible to secure safely and should not be transported. He said it was not a question of refusing to transport the passenger but rather refusing to transport the device.

On August 9, 1991 Joe Meade, the National Access Program Manager of the U.S. Forest Service, while responding to questions regarding their refusal to allow access to wilderness areas by people with disabilities using power wheelchairs, said:

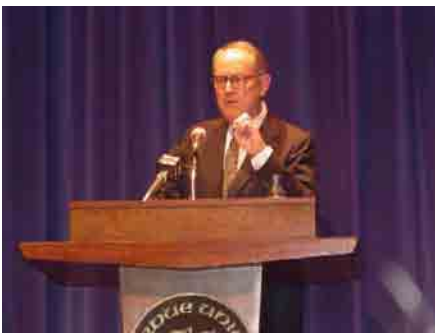
"Our policy is not to hinder a person with a disability from using a nonmotorized mechanical device different than just a wheelchair in order to access the wilderness. Units have the authority and indeed are encouraged to prudently issue permits to individuals who need such an exception. A person may need to offer proof of disability, such as a note from a medical authority or some other method of verification... i.e. a person with a chronic back disability which does not permit them to carry weight on their back may

be issued a permit to use a wheeled primitive cart... remember, wheelchairs are not the only devices serving the disabled.

We draw the line with motorized devices..."

This policy from the United States Forest Service was based upon their draconian interpretation of the 1964 Wilderness Act. Their failure to comply with the 1973 Rehabilitation Act by prohibiting the use of electric wheelchairs by people with disabilities in wilderness areas, was the sole reason that Congress felt compelled to reaffirm in section 507 (c) (I) of the ADA, an act that otherwise had no application for federal agencies, **"that nothing in the Wilderness Act is to be construed as prohibiting the use of a wheelchair in a wilderness area by an individual whose disability requires use of a wheelchair"**

The use of "reaffirm" rather than "affirm" in section 507 of the ADA is demonstrative of the United States Congress's opinion of the Forest Service's then policy of not allowing motorized wheelchairs in Wilderness Areas. Congress felt that the 1973 Rehabilitation Act was clear in its requirement that people with disabilities must be treated fairly and equally by all Federal Agencies, including the USDA Forest Service.



In 1991 in publishing the first regulations implementing the ADA U. S. Attorney General Richard Thornburgh consistently made reference to the fact that there would be no exhaustive list of devices and services because any attempt to do so would omit the new devices that would become available with new and emerging technology.

The 1973 Rehabilitation Act as amended in 1998, in the definitions contained in that act, applicable to every section of that act, including section 504, defined an assistive technology device as **"any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities."**

It is an all encompassing definition and includes all items from Segways to wheelchairs. There is absolutely no definition or mention of any other type of assistive device, including a wheelchair or scooter in the entire 1973 Rehabilitation Act as amended in 1998, nor does there need to be.

Protected Assistive Devices Versus Electric Convenience Vehicles

Those whose disabilities meet the standard of "substantial limitation" of a major life activity have protections which are afforded to them under The 1973 Rehabilitation Act and the Americans with Disabilities Act as well as many state laws.

The graying of America's population has given rise to another class of people who are experiencing physical challenges and even disabilities but disabilities that may not rise to the level of "substantial limitation".

In the case of those who may have difficulty walking it has prompted the operators of large amusement parks, shopping centers, grocery stores, and other places of public accommodation to introduce "electric convenience vehicles" (ECVs) which are available for rent or in many cases on a complimentary basis to encourage the patronage of our older generation at their particular venue.

Individuals with disabilities who have a substantial limitation in their ability to walk require an

assistive device, its use is not a convenience or an option - it is a fundamental necessity for their activities of daily living. It would be a rare case indeed for an individual with a disability not to own the assistive device which best met their unique and specific needs.

The class of people who have a "substantial limitation" and those who rent or use "electric convenience vehicles" for occasional use are distinctly different in their needs, their operational experience, and their rights under the law. It is not devices that are protected under the law; it is an individual's substantial limitation.

For some operators of large amusement parks the electric convenience vehicle has become a source of income often times renting at daily rates that exceed those charged by automobile rental companies to rent an automobile.

As a result many are encouraging guests who are not disabled but who may have concerns about their stamina to seriously consider using a wheelchair, personal scooter or electric convenience vehicle while visiting the venue. They are also advised that they are available for rent on a first-come first-served basis.

While ECV rentals have become a very lucrative market for corporate America, they have become very problematic for people with disabilities who rely on an assistive device for their basic mobility. Users of electric convenience vehicles are typically inexperienced in their operation creating an increased risk for injury to others and they are oblivious to mobility device etiquette when interacting with others.

In 2007 the baby boomer generation started turning age 60 at a rate of 12,000 people a day, fast approaching the age when mobility issues will become an ever increasing reality for them.

Most people with disabilities are supportive of an atmosphere where people who have mobility challenges will be accommodated in the most appropriate way possible. They're also aware of the fact that, with electric convenience vehicles already becoming ubiquitous, merchants, mall operators and the operators of large amusement parks should make every effort to make them only available to those who have a reasonable need.

In our present environment ECV's are being used in an ever-increasing role by those without any problems with mobility. Simon Lezama typifies the type of ECV user which is creating a public backlash which people with disabilities must confront each and every day.



“Las Vegas Lazy”

"It was all the walking," 27-year-old Simon Lezama said on his red Merits Pioneer 3. Lezama, a trim and fit-looking restaurant manager from Odessa, Texas, rented it on day three of his five-day vacation, "and now I can drink and drive, be responsible and save my feet."

Segs4Vets

OEF & OIF Severely Injured

In September 2005 Disability Rights Advocates for Technology (DRAFT) began the Segs4Vets program which awards Segways to men and women of the United States Military who sustained severe injuries while serving our nation in Operation Iraqi Freedom and Operation Enduring Freedom, and their injuries resulted in permanent disability and difficulty walking.

These injuries include leg amputations, traumatic brain injuries, spinal cord injuries, and traumatic burn injuries.



The Segs4Vets program provided Segways and training to the physical and occupational therapy staffs of four major military medical centers: Walter Reed Army Medical Center in Washington, DC; the National Naval Medical Center in Bethesda, Maryland; the Center for the Intrepid at Brooke Army Medical Center in San Antonio, Texas; and the Naval Medical Center San Diego, San Diego, California. The training provided by DRAFT allows the physical therapy

departments of the medical centers to introduce the new mobility technology to our severely injured providing a motivating factor to them and allowing the physical therapy staff to provide initial training on the use of Segway and assessment of each individual for the Segs4Vets program.

In August 2006, DRAFT became the only organization in the United States to have received a blanket waiver for the Segs4Vets program from the United States Marine Corps, Army, Navy, Air Force, and the Department of Defense allowing a donation to active duty military personnel in excess of \$1,000.



The Segway, a device not covered by military medical insurance, has given our disabled veterans who have difficulty walking more mobility and will allow them to perform activities of daily living beyond the physical limitations of other mobility devices.

The Segs4Vets recipients are using Segways to return to college and more easily move between classes across campus and to accompany their wives and families when shopping and on other family outings.

The Segs4Vets program has awarded more than 80 Segways, of which 74 awards have been presented in the last calendar year subsequent to the issuance of the blanket waiver.



President George W. Bush talks with Segs4Vets recipients Sergeant Kortney Clemons (left) and Sergeant Ryan Groves during a visit to the Oval Office on October 16, 2007. Both were wounded while serving in Iraq.

They were attending a meeting of the President's Commission on Care for America's Retuning Wounded Warriors.

Clemons, from Little Rock, Mississippi, is currently attending Penn State University and Groves, from Kent, Ohio, is currently attending Georgetown University. (White House photo by Eric Draper)

U.S. Department of Veterans Affairs

In 2007, the Veterans Health Administration began studying the Segs4Vets program and investigating the Segway as a potential wheeled mobility option for veterans receiving VA health care benefits.

The Prosthetics Clinical Management Program (PCMP) Wheeled Mobility Integrated Product Team (IPT) is reviewing potential appropriate uses of the Segway and other upright powered mobility devices for individuals with mobility limitations related to various orthopedic, neurologic and cardiopulmonary impairments.

Members of the PCMP Wheeled Mobility IPT attended the Segs4Vets training and presentation ceremonies in San Antonio, TX on November 5-7, 2007.



Use of the Segway as an Assistive Device by People with Disabilities

Courtroom 21, William & Mary College Williamsburg, Virginia

In April 2006 in Williamsburg, Virginia, William & Mary Law School's "Courtroom 21," the world's most technologically advanced trial and appellate courtroom, conducted a pioneering, experimental assistive technology trial designed to provide equal access to the courts for persons with disabilities.



Many of the participants in the trial had disabilities including Judge Lynn J. Karowsky, who is losing his sight due to macular degeneration and made use of a number of technological advancements to aid him in presiding over the trial.

Integrated in the trial is the first known use of the Segway PT which allowed one of the attorneys with mobility limitations due to multiple sclerosis to move about the courtroom and deliver his final arguments to the jury from the Segway.

Noel Lee Head Monster, Monster Cable Products



Noel Lee, the Head Monster of Monster Cable, relies on a fleet of Segway PTs for his mobility allowing him to get around his office or to reach his luxury box at Monster Park, the home of the San Francisco 49ers named for his company.

Noel has a neurodegenerative disease which substantially limits his ability to walk but maintains an extraordinary pace with the assistance of the Segway as an assistive device working seven days a week in his role as CEO of Monster Cable Products.

U.S. District Judge James Jarvis Knoxville, Tennessee



On June 6, 2007, 70 year old Senior US District Judge James H. Jarvis II died after a five year battle with a rare form of lung cancer. He had taken senior status but remained active and continued to work part time until the recent months prior to his death.

Judge Jarvis began using the Segway to assist him in maintaining a reasonably active lifestyle.

Judge Jarvis first discovered the Segway when “I read about them in the Wall Street Journal and then I saw them on television. I was immediately intrigued with it, I said I’m gonna get me one of those. Then I found out how much they were, about five thousand dollars and I said well that’s too expensive for me right now! I don’t see any need for it!”

With his COPD progressing he began to experience difficulty traversing the long streets that he walked every day. He no longer considered the Segway too expensive.

“When I became disabled, I said I’m going to go buy one, now I can justify it, it’s a necessity to lead an active life.” For Jarvis, the Segway gave him the ability to maintain a more active, mobile, and normal schedule:

“I got it in October last year (2005) about 7 months ago. Before I started using the Segway I had gotten to the point where sometimes I would be out walking and have to stop and rest on the street.” Jarvis used his Segway every day to travel from his courtroom to his office and back. “It’s a circuitous route and it’s all inside this big complex we have here. I’ll also use it to go to lunch, or go get a haircut, or whatever, all in downtown Knoxville. My friends can walk and talk with me as we go along”, he explained.



Judge Jarvis pointed out to those unfamiliar with the Segway, who don’t understand how it works, find it intimidating or think it’s difficult to operate, “that to know the Segway is to love it”.

“It made life better, a lot better. It’s fun to ride, it even gives me a certain amount of exercise, and it gives me mobility most importantly. It has expanded the areas that I can get around, that’s for sure.”

Michael B. Mayor, MD, Orthopedist Dartmouth University Medical School

Dr. Michael Mayor, a professor of orthopedic surgery at Dartmouth medical school and an adjunct professor of engineering at Dartmouth's Thayer School of Engineering, is internationally known as a member of the biomedical engineering team that revolutionized the design of prosthetic joints.

Dr. Mayor, who recently turned age 70, was diagnosed when he was a junior in high school with a rare form of cancer in his right leg which necessitated the above knee amputation of his right leg. He attended college and medical school with a prosthesis that he felt while functional, was never really comfortable.

A longtime professor of surgery at Dartmouth University, he pushed both legs to their limits with an active lifestyle which eventually resulted in cartilage damage to his good knee, and over time knee replacement surgery. Dr. Mayor's schedule required him to cover vast distances within the Dartmouth Hitchcock Medical Center. He eventually adopted the Segway PT as an assistive device which worked well for him indoors and even allowed him to negotiate ice and snow outdoors in the winter.

The Dartmouth Hitchcock Medical Center Mall is a busy place bustling with wheelchairs, patients pulling IV poles, and small children darting about. But Dr. Mayor negotiates them all with aplomb visiting patient's rooms and attending to his duties and rounds with the assistance of the Segway.



Ezra Halkett, Student, Bangor, Maine



Ezra Halkett sustained injuries in a car accident eight years ago which resulted in a broken neck and severe brain injuries. After surgery and years of physical and occupational therapy Ezra was able to regain some of the speech, balance and short-term memory and motor skills which he lost due to his injuries.

By adopting the Segway he was able to enjoy a degree of freedom and mobility which he never experienced in a wheelchair. The Segway allows him to interact with his teachers and friends at eye level and he regards it as "cool" unlike the wheelchair that he had to use during his extensive convalescence period.

Riding his Segway has become second nature to Ezra; he uses it at school and rides it into town to hang out with friends when the weather is good. Walking is a slow, laborious and unsteady task for him that requires the use of two canes. Using his Segway PT, which he has dubbed "Ginger," makes it possible for Ezra to get to class in the three minutes he has between periods. It also gives him time to socialize in the halls.

Capitol Hill Washington, DC



On May 11, 2000 Jerry Kerr testified before the United States House of Representatives, Committee on Resources, Subcommittee on National Parks, at an Oversight Hearing on Disability Access in the National Park System.

The use of Segways on Capitol Hill in Washington, DC by people with disabilities is a now frequent and common occurrence.

Major Daniel Gade, Associate Director for Disabilities on the White House Domestic Policy Council, uses a Segway as an assistive device. Major Gade while serving in Operation Iraqi Freedom was severely wounded resulting in the above knee amputation of his leg. Prior to Major Gade serving on the White House Domestic Policy Council he had done an internship for Senator Isakson of Georgia and used a Segway to navigate between the Senate office buildings and the Capitol building.

Major League Baseball St. Louis Cardinals Busch Stadium



The Segway is allowing people with disabilities easier access to major league sporting events, allowing them to navigate ramps that are beyond their capacity in wheelchairs alleviating the need to wait on overburdened elevators for access to different levels of the stadiums.

The maneuverability of the Segway provides them an easier opportunity to make their way through crowds and access their seating.



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Jerry Kerr
President/Founder
Disability Rights Advocates For Technology

Jerry Kerr together with Leonard Timm and Fred Kaplan founded **Disability Rights Advocates For Technology**, a 501 (c) (3) Public Charity. “DRAFT” is dedicated to promoting the increase in access to, provision of, and funding for, assistive technology devices and assistive technology services, in order to empower individuals with disabilities, so they may achieve greater independence, productivity, and integration and inclusion within the community and the workforce.

Both Mr. Kerr and Mr. Timm use a Segway HT in addition to their wheelchairs. They recognized early on the benefits that the Segway HT could provide to those who have difficulty walking. **“For the first time new technology and the principles of universal design have come together to offer us a mobility device for those who can stand but have difficulty walking, which will allow them mobility; standing.”** Mr. Kerr is dedicated to exploring the potential that universally designed technology solutions offer the more than 20 million Americans who have difficulty walking, including our senior citizens. In September 2005 Mr. Kerr started DRAFT’s Segs4Vets program donating Segways to members of the United States Military whose service to our country has resulted in disability and difficulty walking.



[Jerry with his wife Pam](#)

On July 25, 1998 Jerry Kerr's life was suddenly transformed from that of a physically active chief executive officer of a national award-winning home-building and real estate development corporation, avid outdoorsman and pilot; to that of a spastic quadriplegic.

Mr. Kerr was involved in a diving accident shattering his C-4 vertebrae requiring it to be replaced with a cadaver bone. The prognosis was that he would never again move from the neck down. Recognizing that his life would forever be very different, he believed that he could still live a very rewarding and high-quality life, by dedicating his life to the service of those with disabilities.

Determined to maximize his potential for recovery, physical and mental health and life span, Mr. Kerr embarked upon a rigorous physical therapy schedule, four hours a day, six days a week, and sought out every advancement in technology which potentially might be beneficial to him. Through this continued regimen, while still neurologically impaired from the neck down, he has regained the ability to stand briefly and even walk a few paces with the aid of a cane.

Mr. Kerr has devoted his remaining energies to advocating for the rights of individuals with disabilities and as a champion of the benefits that new technologies and universal design can bring to their lives. In 2006 he testified before the United States Congress regarding accessibility in our National Park system and he has been a featured speaker at No Barriers/Dolomiti 2005 an International Symposium on technology and physical disability in Cortina Italy, The Community Transportation Association of America’s National Exposition, and the Alaska Community Transportation Conference, among many others.



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October 30, 2007

Summary of expertise in the use of Segways by People with Disabilities

Jerry Kerr is recognized as one of the leading authorities on the use of Segways by people with disabilities. As he is himself disabled, and still makes daily use of a wheelchair, in early 2003 soon after its introduction he began using the Segway as his primary means of mobility both inside and outside of the home.

Kerr is a strong advocate for the adoption of universally designed technology solutions as the only sustainable approach for continued improvement in quality of life issues effecting people with disabilities and senior citizens and the opportunities these solutions offer for extending the independent life of the baby boomer generation and people with disabilities.

He has been a featured speaker and presenter at international symposiums and national conferences focusing on issues which effect people with disabilities and addressing the benefits that technology and universal design can provide to them. Included in these appearances were No Barriers/Dolomiti Symposium in Cortina Italy, the Community Transportation Association of America's National Exposition, No Barriers Symposium in Squaw Valley, California, and in May 2006 he testified before the United States Congress on access issues effecting people with disabilities in the National Park System, particularly as they concerned the use of Segways.

In September 2005, Jerry Kerr and his organization, Disability Rights Advocates for Technology (DRAFT), an all volunteer 501(c) (3) nonprofit organization with no paid staff, started the Segs4Vets program, awarding Segways to men and women of the United States Military who had sustained severe injuries while serving our nation in Operation Iraqi Freedom and Operation Enduring Freedom and whose injuries had resulted in permanent disability and difficulty walking.

The Segs4Vets program has provided Segways and training to the physical and occupational therapy staff at four major military medical centers: Walter Reed Army Medical Center in Washington, DC; the National Naval Medical Center in Bethesda, Maryland; the Center for the Intrepid at Brooke Army Medical Center in San Antonio, Texas; the Naval Medical Center San Diego, San Diego, California.

In August 2006, DRAFT for its Segs4Vets program, became the only organization in the United States to have received a blanket waiver from the United States Marine Corps, Army, Navy, Air Force and the Department of Defense allowing a donation to active duty military personnel in excess of \$1000. To date the Segs4Vets program has awarded 78 Segways, funded entirely through donations from concerned citizens and organizations across the country. Neither DRAFT nor the Segs4Vets program receives any financial support from Segway Inc., or its officers.

Through his work with severely injured military personnel, Jerry Kerr has recently agreed to serve as a consumer member of a Scientific Advisory Panel of a Multidisciplinary Clinical Consortium for a major university in the United States researching solutions and treatment for Post-Traumatic Stress Disorder and Traumatic Brain Injury suffered by our returning combat veterans.

Chronological Listing

March 2003

Kerr began using the Segway as his primary means of mobility both inside and outside of his home.

September 2003 U.S. DOT ACAA Complaint

Jerry Kerr filed and successfully pursued a complaint with the United States Department of Transportation against Continental Airlines for violating the Air Carriers Access Act by charging people with disabilities who were using the Segway as an assistive device for its transportation, and Continental Airlines' refusal to allow people with disabilities to gate check their Segway.

February 2004 Formation of Disability Rights Advocates for Technology "DRAFT"

Jerry Kerr together with Leonard Timm and Fred Kaplan, formed Disability Rights Advocates for Technology, DRAFT, a 501(c) (3) nonprofit organization representing people with disabilities who refuse to be defined by their disability and whose passionate enthusiasm for participating in the activities of life is supported by Universal Design and new and emerging technologies.

March 2004 City of San Francisco, California

Worked with the city of San Francisco's Mayor's Office on Disabilities on the issuance of guidance, in compliance with title II of the ADA, exempting people with disabilities who use Segways as assistive devices from the ordinance restricting the use Segways in the city of San Francisco.

May 2004 August 2005 - United States Department of Transportation

Worked with the United States Department of Transportation's Office of Civil Rights regarding the issuance of ADA guidance for the transportation of people with disabilities who use Segways as an assistive mobility device in the United States.

May 2004 Zoological Society of San Diego, California

Worked with the office of Risk Management and the office of Security of the Zoological Society of San Diego in the development of a policy which allows the use of Segways by people with disabilities while visiting the San Diego Zoo, Wild Animal Park and their other venues.

September 2004 International Segway Festival, Bonita Springs, Florida

Featured speaker on the use of Segways by people with disabilities at the International Segway Festival in Bonita Springs, Florida.

October 2004 Alaska Community Transportation Conference, Anchorage, Alaska

Featured speaker and presenter on the transportation of people with disabilities using Segways aboard buses and para-transit vehicles at the Alaska Community Transportation Conference in Anchorage, Alaska. This included conducting workshops with nationally recognized safety experts on securing Segways aboard vehicles and the behavior of the devices during emergency situations.

June 2004 City Attorney's Office Seattle, Washington

Provided guidance to the City Attorney's Office in Seattle, Washington for the development of ADA compliant ordinances regulating the use of EPAMD's (Electrical Personal Assistive Mobility Devices).

May 2005 National Exposition, Community Transportation Association of America

Featured speaker and presenter on the transportation of people with disabilities using Segways aboard buses and para-transit vehicles at the Community Transportation Association of America's National Exposition.

July 2005 No Barriers Symposium, Cortina, Italy

Featured speaker and presenter at No Barriers/Dolomiti an international symposium on new and emerging technologies and their benefit to people with disabilities.

February 2006 Walter Reed Army Medical Center, Washington, DC

Provided training to the physical and occupational therapy staff of the Amputee Patient Care Center at Walter Reed Army Medical Center in the assessment and training of severely injured military personnel in the safe operation of the Segway.

February 2006 Colorado Senate, Denver, Colorado

Offered testimony before the Senate Transportation Committee of the State of Colorado on the use of Segways by people with disabilities.

April 2006 Courtroom 21, William and Mary Law School, Williamsburg, Virginia

Provided training and equipment for the first-ever use of a Segway in a courtroom as a mobility device by an attorney with disabilities in the presentation of their case and in the delivering of their closing remarks.

May 2006 Testimony before the United States House of Representatives, Washington, DC

Offered testimony before the United States House of Representatives Committee on Resources, Subcommittee on National Parks during an oversight hearing on disability access in the National Park System.

May 2006 National Naval Medical Center, Bethesda, Maryland

Provided training to the physical and occupational therapy staff at the National Naval Medical Center in the assessment and training of severely injured military personnel in the safe operation of the Segway.

July 2006 United States Access Board, Washington, DC

Offered testimony before the United States Access Board with regard to the use of Segways aboard transportation vehicles and proposed changes for design requirements in the issuance of new ADAAG Guidelines for Transportation Vehicles.

October 2006 Vision for Humanity Award, Los Angeles, California

On behalf of Disability Rights Advocates for Technology, presented Dean Kamen with DRAFT's "Vision for Humanity Award" recognizing his role in improving the quality of lives for people with disabilities through his creation of the iBOT mobility system.

October 2006 International Segway Festival, Long Beach, California

Featured speaker and presenter on the use of Segways by people with disabilities and the Segs4Vets program at the international Segway Festival in Long Beach, California

October 2006 National Park Service, Yosemite National Park

Conducted a 3-day training and assessment conference with the staff of the National Park Service at Yosemite National Park, Yosemite, California for the development of a system wide policy for the National Park Service on the use of Segways by people with disabilities.

November 2006 Brooke Army Medical Center, San Antonio, Texas

Provided training to the physical and occupational therapy staff at Brooke Army Medical Center in the assessment and training of severely injured military personnel in the safe operation of the Segway.

November 2006 Rehabilitation Institute of Chicago, Chicago, Illinois

Keynote Speaker on the role of Universal Design and new and emerging technologies which benefit people with disabilities at the annual meeting of the Machines Assisting Recovery from Stroke National Advisory Board at the Rehabilitation Institute of Chicago.

November 2006 United States Congress-Conference on the

Responsiveness of the National Park Service to Issues of Access

Provided commentary with regard to the responsiveness of the National Park Service to issues raised with regard to accessibility by people with disabilities at the May 2006 Congressional Hearings.

April 2007 St. Louis University, St. Louis, Missouri

Guest Lecturer on the role of Universal Design and new and emerging technologies which benefit people with disabilities.

May 2007 Human 2.0, New Minds, New Bodies, New Identities

Massachusetts Institute of Technology, Cambridge, Massachusetts

Provided training and the use of a modified Segway for John Hockenberry, a host and the master of ceremonies at a symposium dedicated to ushering in a new era for human capability through the use of a new category of tools and machines poised to radically change humanity at a velocity well beyond the pace of human evolution.

June 2007 No Barriers Festival, Squaw Valley California

Featured speaker and presenter at the No Barriers Festival, an International Symposium, in Squaw Valley, California on "Universal Design, Technology and Common Sense, A Fresh Approach for People with Disabilities and an Aging America." He was also a featured participant in the roundtable discussion of creative solutions for the funding and affordability of new and innovative technology.

In addition, DRAFT provided assessment and demonstration for more than 400 people with disabilities allowing them to experience the use of the Segway.